UNIT-1 (Salvage Evaluation of Fire Situation)

Q.1 define salvage

ANS: **Salvage (in fire fighting)** is the **process of protecting and saving property from damage during and after a fire**, especially damage caused by **water, smoke, heat, and firefighting operations**, after life safety and fire control have been addressed.

OR

"Salvage is the firefighting operation aimed at saving property and reducing loss from fire and firefighting activities."

Objectives of Salvage Operation

- Reduce **property loss**
- Prevent **water damage** from firefighting
- Protect **valuable equipment, records, and materials**
- Support **faster recovery** after the fire

Common Salvage Operations

Salvage operations are the activities carried out during and after firefighting to reduce loss of property and prevent secondary damage caused by water, smoke, heat, and debris. These operations aim to protect valuable assets while ensuring overall safety.

1. Covering Property

Covering property is one of the first salvage actions performed at a fire scene. Salvage covers such as tarpaulins or plastic sheets are used to protect furniture, machinery, documents, and stored materials from water spray, falling debris, and soot. Proper covering helps in minimizing water damage and preserving valuable property.

2. Water Control

Water control is critical because excessive firefighting water can weaken structures and damage equipment. This operation involves diverting water using chutes or drains and

removing accumulated water by pumping, mopping, or squeegeeing. Effective water control reduces the risk of corrosion, mold growth, and further structural damage.

3. Removing Valuables

During salvage operations, valuable and sensitive items such as important documents, electronic devices, chemicals, and artworks are carefully shifted to safe and dry locations. This prevents additional damage and ensures that essential assets are preserved for future use.

4. Ventilation

Ventilation helps in removing smoke, heat, and toxic gases from the affected area. By improving air circulation, ventilation reduces smoke damage, lowers humidity, and creates safer conditions for firefighters and salvage personnel while also protecting property from long-term deterioration.

5. Debris Removal

Debris removal involves clearing burnt, broken, or damaged materials from the fire scene. This helps prevent accidents, reduces fire load, and protects undamaged property from further harm. Controlled debris removal also makes inspection and restoration work easier.

6. Overhaul Support

After the fire is extinguished, overhaul support is provided to locate and eliminate hidden fire pockets in walls, ceilings, and equipment. Salvage support during overhaul ensures that these checks are carried out carefully, preventing re-ignition while minimizing unnecessary damage to the remaining structure and contents.

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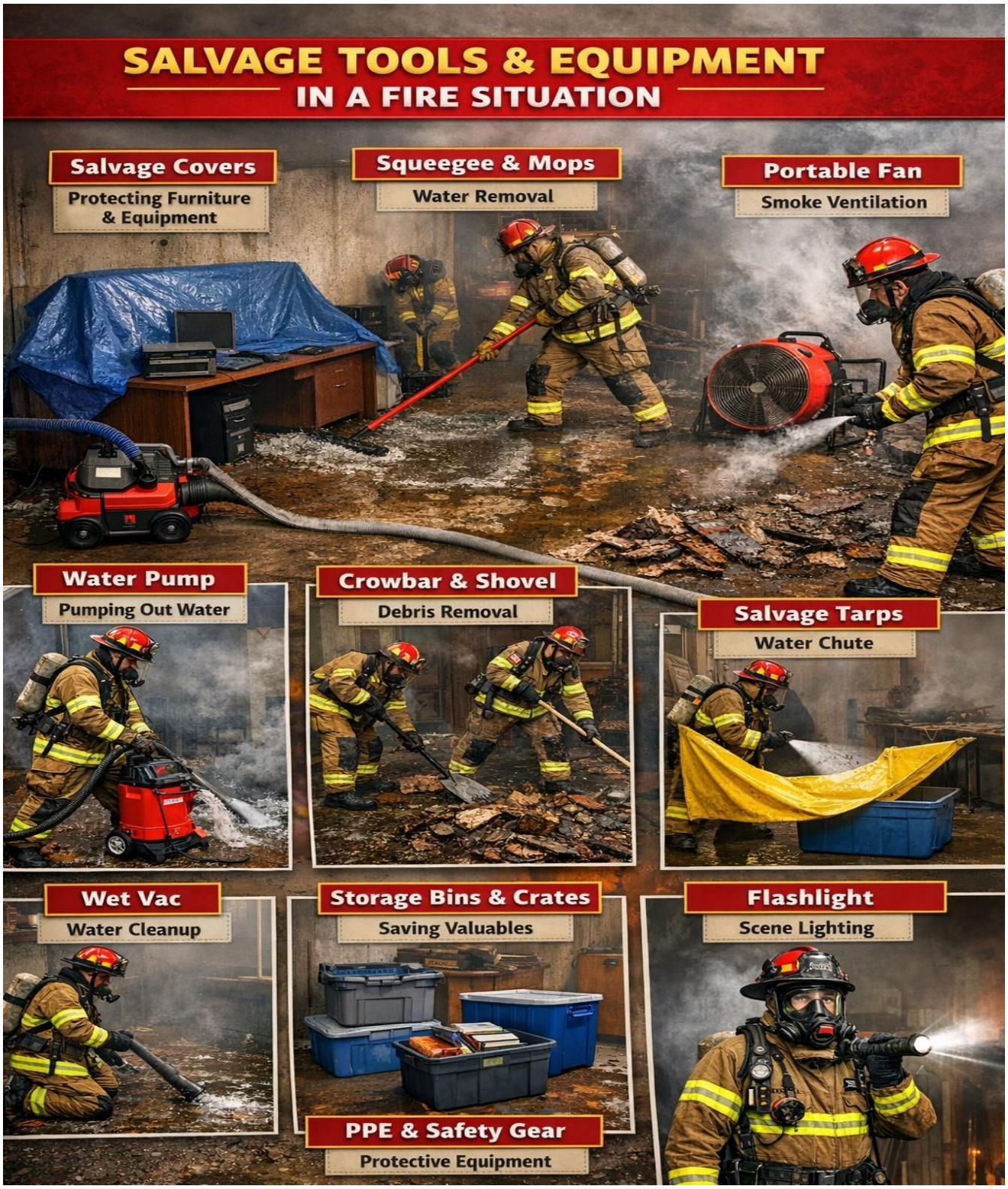
SALVAGE TOOLS & EQUIPMENT
IN A FIRE SITUATION



Salvage Tools and Equipment

No salvage operation can be successful unless the necessary tools and equipment are properly understood and used. Salvage tools and equipment range from expensive items such as blowers and exhaust fans to simple tools like hammers and nails, all of which play an important role during salvage operations.

The main and most important salvage tools and equipment used in salvage operations are as follows:

1. Salvage Covers
2. Floor Runners
3. Water Vacuum
4. Portable Pumps
5. Water Chute
6. Miscellaneous Tools

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1. Salvage Covers

Salvage covers are made from closely woven, waterproof canvas material. They have reinforced corners and hems with grommets for hanging. Covers made of polyethylene plastic are lightweight and highly water-resistant. They are not affected by alkalis, oils, acids, caustics, or solvents.

Salvage covers are available in different sizes, such as 10 ft × 10 ft, 10 ft × 12 ft, and 12 ft × 16 ft, etc. Polyethylene covers have the advantage of being lightweight and water-resistant.

Salvage covers are also the main material used for creating **water chutes** and **catch-alls**.

Catch-all

A **catch-all** is essentially a small sump used to catch water that is leaking into an area where it should not accumulate.

Water Chute

If the amount of water is too much for a catch-all, a **water chute** is used so that the water can be diverted out of the building through a window, door, or down ladders. A water chute is formed using **a ladder or pike pole combined with a salvage cover**.

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2. Floor Runners

Another item used in salvage operations is the **floor runner**, which is usually **8 feet wide and 20 feet long**. It is generally made of lightweight canvas-type material for easy deployment.

It is used to protect floor areas along traffic routes. For example, if a fire occurs in one area of a building, firefighters should use floor runners so that they do not damage carpets or flooring in other parts of the building.

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3. Water Vacuum

A very useful tool in salvage operations is the **water vacuum**. Water vacuums are used to remove water from surfaces and flooded areas. They can also be used to quickly drain catch-alls to prevent overflow.

The typical capacity of a water vacuum is around **5 gallons**.

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4. Portable Pumps

Portable water pumps are used to remove water from **basements, elevator shafts, and sumps**. Fire department pumps should not be used for this purpose because they are heavy, expensive, and are not intended to pump the dirty, gritty water commonly found in such locations.

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5. Miscellaneous Tools

For conducting salvage operations at a fire scene, salvage equipment should be stored at an appropriate location. Smaller tools should be kept in a specially designated salvage toolbox or container to make them easier to carry and use.

List of Typical Salvage Tools

- Electrician pliers
- Side cutters
- Chisels
- Tin roof cutter
- Aviator tin snips (for cutting curves and irregular shapes)
- Can opener
- Pipe wrench
- Hammers
- Hacksaw
- Screwdrivers
- Wood saw
- Sledgehammer
- Hand drill
- Ring and fixed spanner set
- Knife
- Measuring tape
- Nail-puller hammer
- Permanent marker
- Nails
- Screws
- Torch/flashlight

Salvage Procedure

Effective salvage is a continuous process and involves a wide range of activities and considerations. Tasks may arise in varying order or simultaneously, and there is no clear separation between different phases of work. However, the various aspects can be arranged into the following groups:

1. Preliminary Work

2. Salvage considerations to be borne in mind while firefighting
3. Active prevention of avoidable damage
4. Mitigating the effects of the fire and firefighting operations

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1. Preliminary Work (Before a Fire)

As with other aspects of the firefighter's job, training is very important. The value of salvage should be emphasized, and firefighters should naturally keep salvage considerations in mind when fighting a fire. They should also be familiar with the salvage operations they may need to undertake. As far as possible, firefighters should be familiar with the salvage potential of different premises within their station area.

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2. Salvage Considerations (During Firefighting)

Firefighters provide basic assistance to salvage by carrying out their duties in such a way that they do not cause unnecessary damage or undo salvage work already performed. The following points should be followed:

1. Keep the amount of water used to a minimum.
2. Reduce the number and size of nozzles as soon as the situation permits.
3. Use hand-controlled branches and hose-reel jets where possible.
4. Change to smaller jets, fog, or spray as soon as practicable.
5. Replace damaged or leaking hoses promptly.

Salvage Considerations at Neighboring Premises

Firefighters should, of course, attempt to prevent the fire from spreading to neighboring premises. They should also ensure that their firefighting operations do not cause damage to adjacent property. Fire and water can enter neighboring buildings:

- under doors,
- through defective brickwork in separating walls,
- via dislodged or broken slates or tiles, and
- through broken or partially open windows.

3. Active Prevention of Avoidable Damage

1. Covering Goods -

i) All items that may be damaged during firefighting operations should be covered with waterproof sheets.

ii) Items at the highest risk are those on the floors below the fire floor; therefore, they should be covered on priority.

iii) Covering of goods should be carried out systematically, room to room and floor to floor.

iv) Firefighters should place a carpet or protective material on the furniture before covering it.

v) Collect fragile items such as glass, china, and pictures, and place them somewhere safe from damage or breakage before covering them.

vi) The seats of armchairs and tables are good places to keep fragile materials.

vii) It is often better to use transparent polythene sheeting rather than salvage sheeting when covering fragile items, so that it is possible to see what is underneath.

viii) Work is faster and more efficient when personnel work in pairs while covering goods.

ix) They must be well trained.

x) They must ensure that items are thoroughly covered at the top and sides, with the sheet reaching the bottom but not dragging on the floor.

xi) Where one sheet is not sufficient, they should cover the top first and then place successive sheets around the sides so that they overlap beneath the upper sheet, allowing water to run off.

Moving Contents (Salvage)

1. When it is necessary to move contents to a safer part of a room, they should, whenever possible, **not be removed from the premises**, except in exceptional circumstances.
2. If items are taken away, they may suffer from **weather exposure** and may also be subjected to **theft and vandalism** (intentional or malicious damage to public or private property).
3. If items have to be moved outside, **all doors, drawers, cupboards, and controls** should be closed/turned inward, and the entire item should be **covered with a sheet**.

Damming (Definition)

Damming: The act of holding back or confining water by using a dam or barrier. It is used to control the flow of water, prevent it from spreading into unaffected areas, and assist in water removal by containing it.

Damming Procedure

1. Firefighters should prevent water from flowing into unaffected areas by **damming the openings** leading into those areas.
2. They can use **salvage sheets** or other suitable materials such as **sacking (coarse cloth like gunny)**, which can be folded to the required size.

Holding Water Back

1. Firefighters should prevent water from flowing into unaffected areas by damming the openings leading into them.
2. They can use salvage sheets or other materials such as **sacking** (a coarse cloth like gunny), which can be folded to the required size.

3. They can also use salvage sheets as dams to stop water dripping from floors above.
4. They should place the sheets on the floor and then fold the edges several times inward to form a barrier.

Diverting Water

1. It is often necessary to divert water out of a building or into suitable drains.
2. This can be done by opening a salvage sheet to its full length but only half its width, then folding the edges lengthwise to create the required depth.
3. Several sheets arranged in this way can be placed end-to-end with overlaps in the direction of water flow.
4. Another method is to secure one end of the salvage sheet to the ceiling as high as possible and pass the other end through a window or other opening at a lower level.

Use of Drains and Manholes

1. In large industrial or commercial premises, it is very important to locate drains and keep them free from debris.
2. A wire mesh guard is the most suitable means for this purpose.
3. Where there is a large amount of debris, it is advisable to assign a person specifically to keep the wire mesh guards clear.

Preventing Other Damage

1. While moving items aside or covering them, precautions should be taken to avoid damaging them during these activities.
2. Special attention should be given to carpets and rugs.
3. In shops, hotels, and offices, losses due to damage to carpeting alone can be very expensive.
4. In some prestigious hotels, carpets and rugs may be extremely costly.
5. Firefighters should therefore prevent dirt and debris from being trodden into carpets as far as possible. *(Trodden = walked on/pressed in.)*

6. Where possible, carpets and rugs should be rolled up and placed in a safe area. If that is not possible, they should be covered with salvage sheets or other appropriate material.

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4. Mitigating the Effects of Fire and Firefighting Operations

Reducing Water Damage

Reducing Damage from Water Installations (Burst Pipes etc.)

Water escaping from burst or fractured pipes, or from overflowing tanks, can cause additional damage. When this occurs, firefighters should:

- Close the stopcock/valve.
- If the stopcock is inaccessible, flatten the lead pipe on either side of the burst to stop the flow.
- Water from a fractured pipe should be diverted to a suitable place for disposal.
- If defective tank ball valves allow a tank to overflow, firefighters should secure them in the closed position.

Reducing Smoke Damage

The importance of early ventilation is increased as it helps to reduce smoke damage and assists firefighting operations. Ventilation plays an important part in salvage; however, firefighters must bear in mind that careless ventilation can seriously affect fire conditions and may cause the fire to spread.

Reducing Damage to Stock

If stock has collapsed or has been dislodged into gangways/aisles, firefighters should not leave it there to be trodden on or further damaged. As soon as practicable, it should be removed and placed safely. However, wet goods should not be placed on top of dry goods.

Subsequent Restoration and Protection

The actions already undertaken by firefighters should have protected goods from water damage and removed most of the waste water.

Removing Covers

Firefighters should begin uncovering the items they have sheeted over as soon as conditions allow

@Case study in different type of occupancies in salvage evaluation of fire situation:

(1)The **World Trade Center (WTC) fire incident in the USA** is one of the most significant case studies for understanding fire behavior and salvage evaluation in high-rise commercial occupancies. On **11 September 2001**, the Twin Towers of the World Trade Center in New York City were struck by hijacked aircraft, resulting in severe structural damage and the release of large quantities of jet fuel. The immediate ignition of jet fuel caused intense, multi-floor fires that spread rapidly through office spaces containing high fire loads such as paper, furniture, plastics, and electronic equipment. The impact also dislodged fireproofing material from structural steel members, exposing them directly to high temperatures. As the fires continued, the steel structures weakened, leading to progressive structural failure and the eventual collapse of both towers.

From a **salvage evaluation perspective**, the WTC incident represents an extreme situation where conventional salvage operations were virtually impossible during the fire. The primary salvage priority was **life safety**, including evacuation and rescue of occupants below the impact zones. Firefighters focused on rescue efforts and preventing fire spread to nearby buildings rather than protecting property inside the towers. Due to inaccessible fire floors, loss of water pressure at higher elevations, continuous fire growth, and imminent collapse risk, no meaningful internal salvage of office contents, equipment, or records could be carried out. This highlights a key limitation of salvage operations in catastrophic high-rise fires where structural integrity is compromised.

After the collapse, salvage activities shifted to the **post-fire recovery phase**, which involved searching for survivors, recovery of human remains, identification and preservation of critical evidence, and controlled removal of approximately 1.8 million tons of debris. Some underground infrastructure and nearby buildings were partially

salvaged through exposure protection and debris management. The economic loss was estimated at around **60 billion US dollars**, making it one of the costliest disasters in history. The WTC case clearly demonstrates that in extreme fire scenarios involving large commercial occupancies, salvage operations are secondary to life safety and may only be feasible after the incident, serving as a crucial lesson for fire safety planning, structural fire protection, and emergency response strategies.